# BEHAVIOR DISORDER AS A FUNCTION OF THE RELATIVE STRENGTH OF ANTAGONISTIC RESPONSE-TENDENCIES

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It is probably true that all situations in which abnormal behavior has been observed in animals may be interpreted as *conflictful*—if not in the Pavlovian sense of a 'clash' of excitatory and inhibitory cortical processes, then at least in the sense that antagonistic adjustments are required of the animal simultaneously or in rapid succession.[1] This postulate has been employed by a great majority of workers in the field, although in some instances subjective, usually psychoanalytic, interpretations have been deductively imposed upon the data. For the most part, however, analysis of the traumatic procedures employed has not proceeded far beyond the recognition of the existence of conflict and its significance in the precipitation of experimental neurosis.

In a recent study of motor conflict in human subjects, Sears and Hovland (24) have reported evidence for an hypothesis which appears to be significant for the understanding of conflict situations. As they have stated it:

> . . . the probability of blockage as a reaction to conflict increases with the approach of the strengths of the conflicting responses to equality.[2]

A number of interesting animal investigations which contribute further evidence in support of this hypothesis have been reviewed by Miller (17) in Hunt's *Personality and the behavior disorders*. In none of these studies were disruptions of behavior more severe than blocking (failure to respond for a given period) or vacillation manifested, and it seems probable, therefore, that the *absolute* as well as the *relative* strengths of the antagonistic response-tendencies must be considered. Examination of the literature demonstrates the significance of the equivalence hypothesis for situations in which more marked behavior disorders have been reported.

At the human level, the equivalence hypothesis has found expression in early psychiatric writings. The familiar example concerns the soldier in the war situation. If fears for personal safety dominate, the man will desert; if social values and fear of punitive measures consequent to desertion dominate, he will remain and fight; but in the event that neither set of motives is strong enough to prevail, if they each make equally intense demands upon the individual, neurosis will supervene. Sears and Hovland (24) have pointed out that such reasoning is circular unless independent measures of the strength of the opposing response-tendencies are possible. Fortunately in many of the animal experiments such independent indices can be found.

Masserman's (16) recent experiments with cats provide an excellent illustration. The animals were confined in a cage and taught to take food from a covered box. When this response was learned, a sharp blast of air was directed across the box at the moment of food-taking. The conditions elicited dis-

[1] Razenkov, in Pavlov's laboratory, produced behavior disorders in dogs by presenting positive and negative conditioned stimuli in rapid succession (22, p. 343).

[2] For convenience this statement will be referred to subsequently as the *equivalence hypothesis*.

turbed behavior in many of the cats, and a consideration of the techniques employed by Masserman to accentuate or alleviate the symptoms shows that variation of the strength of the conflicting forces was the effective factor. Animals in which avoidance tendencies dominated could be made to show marked symptoms when the period of food-deprivation was increased. Leaving the door of the food box open, introducing especially desired food, or forcing the animal nearer to the food had the same effect. On the other hand, almost identical procedures tended to *alleviate* the symptoms of animals whose behavior had already been disrupted. The equivalence hypothesis fits these results nicely.

Many early experiments were performed in Pavlov's laboratory on the 'interaction of reflexes.' In 1916 Pavlov reported the results of work with Petrova on the opposition of the 'food reflex' and the 'guarding reflex' and concluded:

> You need only to increase the number of stimuli for one reflex, *i.e.*, to add weights in one pan of the scale and it sinks—one reflex suppresses the other. Depending upon the reflex to which you add the stimulus, the scale pan in which you place the additional weight, the one or the other predominates (22, p. 259).

Pavlov, as translated, referred to experimental neurosis as the consequence of disturbance in the 'balance' of excitatory and inhibitory processes (23), but it may be inferred from his experiments that he meant the failure of one or the other of these processes to achieve the dominance requisite for an ordered response. The difficult-discrimination technique which he employed to produce disruption provides a case in point. The more closely an ambiguous stimulus resembles one of the original stimuli which have been differentiated, the more likely it is to elicit behavior appropriate to that stimulus. At some intermediate point, however, it will be equally appropriate to the responses called out by both of the original stimuli, and disruption of behavior will occur. These relationships have been worked out quantitatively for a brightness-discrimination situation by Brown (2). In Pavlov's theory, consequent to the conflict there will be an 'undisputed predominance' of one set of the antagonistic processes (excitatory or inhibitiory) which will give form to the neurosis.

Despite the fact that most of the significant work in the field of experimental neurosis has been done with the classical conditioning situation, results obtained from the study of convulsive seizures in rats constitute important evidence for the equivalence hypothesis. Certain investigators (18, 19, 20, 21, 25) have objected to Maier's (10) original interpretation of the convulsive pattern as a neurotic manifestation stemming from conflict situations to which the animal is subjected, and prefer instead to regard the seizure as a reflex response to auditory stimulation.[3] Finger (3) recently has reviewed the work on the problem from this point of view. But an abundance of evidence seems to indicate that the objection is unfounded (1, 4, 6, 11, 12),[4] and the fact that some of the same evidence supports an hypothesis related to the general problem of experimental neurosis emphasizes the relation of the pattern in question to behavior disorders appearing in other situations.

Convulsive seizures can be produced in rats enclosed in a cage and exposed

[3] Hence the terms 'audiogenic' and 'audio-epileptic' which are used to designate the seizures.

[4] Perhaps the strongest evidence has been contributed by Griffiths (4) who found that seizures could be elicited when shock from the platform of the jumping stand was employed in place of auditory stimulation.

to auditory stimulation of a wide range of frequencies.[5] It can be demonstrated readily that this stimulation tends to elicit strong avoidance responses.[6] But the walls of the cage constitute a more or less effective barrier to such behavior, and a conflict exists for the animal. In this situation the rat usually shows excited exploratory behavior which may be followed either by a strong crouching pattern (representing a dominance of the inhibitory factors) or by a characteristic convulsive seizure.

There is a good deal of evidence to show that the occurrence of seizures is a function of the relative strength of the conflicting excitatory and inhibitory factors in the situation. As the size of the cage is increased, seizure frequency is reduced (11). If an activity wheel, which is less restrictive in that it permits greater scope of activity, is substituted for the cage the same results are obtained (6). On the other hand, if the possibilities for action are greatly *reduced*—by binding or harnessing the animal—a reduction in the frequency of seizures (in these instances to zero) again is obtained (4, 9, 15). With the inhibitory factor constant and the stimulus intensity increased, formerly normal animals begin to show seizures (21). It would seem to follow from this evidence that disruption stems from an *equation* of the opposing response-determinants.

The importance of restriction in the production of experimental neurosis has long been emphasized (7, 8, 10, 12, 13, 26). It has been found that an animal will tend to avoid responding in terms of stimuli which are difficult to discriminate unless limitations are imposed upon the scope of its behavior. The following quotation from Witkin provides a representative statement of this point of view:

> . . . the animal's typical mode of response to a conflict which has become very difficult is to resort to extraneous types of behavior. The severity of the disturbance produced by a conflict in different types of situations is related to the degree of restriction imposed by the given situation upon the animal's field of action. A more restricted field of action curtails the opportunity for extraneous responses, focalizes the conflict prepared by the experimenter, and thereby makes an adequate adjustment more difficult (26, p. 73).

In the light of the equivalence hypothesis restriction must be given a less central role.

In the discrimination situation conflict may exist at two levels—at the *stimulus level* and at what may be called the *situational level.* Stimulus conflict induces avoidance behavior which can be curtailed by various physical restraints, and a 'forcing agent' such as shock or compressed air usually is introduced to compel reaction to the stimuli. Conflict now exists at the situational level. In the classical conditioning situation an additional compelling stimulus is not required because the stimuli to be discriminated apparently call out the learned responses more directly (13). That the probability of disruption does not vary concomitantly with degree of restriction may be seen in the fact that *extreme* restriction may operate to *prevent* disruption, not only in the seizure situations described above, but in the Pavlov frame as well. While Parmenter (5, p. 289) reported the disappearance of symptoms when his neurotic sheep was allowed the freedom of a pen (5 feet square) instead of being confined in the frame, Marcuse and Moore (14), also working at the Cornell Laboratories, found that tantrum behavior could be induced in a formerly

[5] It was believed originally that only higher frequencies were effective, but seizures may be produced as well by tones of low frequency (18).

[6] In the experimenter as well as in the animal.

quiet pig by *loosening* the animal's harness. Restriction, therefore, is important only as one of the antagonistic influences operating upon the animal and contributes to disruption only when its magnitude is equivalent to that of the opposing influences.

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